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*Preliminary Survey of Waste Materials
Deposited at the Proposed Park Site,
Hamilton Harbour, November 1984.*

**Air Resources Branch
Phytotoxicology Section**

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Preliminary Survey of Waste Materials Deposited at the Proposed Park Site, Hamilton Harbour, November 1984

On November 29, 1984, 13 stations were sampled at the proposed park site (former Lax property), Hamilton (Figures 1 & 2). The stations were selected using a map provided by the regional office (Figure 1) and during a reconnaissance of the area. With the exception of sites 4 and 5, with site 5 being a control location in the park, the sampling sites were devoid of vegetation. A description of the samples collected (0-15 cm depth) appears in Table 1. No visual assessment of possible phytotoxic effects was made due to the lateness in the season.

Samples were brought back to the Phytotoxicology Laboratory and processed using standard Phytotoxicology procedures. All samples were chemically analyzed for 16 elements listed in Table 2 by the Inorganic Trace Contaminants Section, Laboratory Services Branch of the MOE. Additionally, conductivity and pH analyses were performed in the Phytotoxicology Laboratory.

Results, given in Tables 1 and 2, indicate that the ash, baghouse material, blast furnace sand and other materials contained high and often phytotoxic concentrations of many of the elements (Table 2).

According to Phytotoxicology Section proposed residential Clean-up Criteria (based on potential phytotoxicity, except molybdenum and selenium, which are based on potential toxicity to grazing animals, and lead and cadmium, which are based on human health considerations), 7 of the 13 locations had 3 or more



elements present in unacceptably high concentrations. Two additional stations exceeded the Clean-up Criteria for 2 elements. Stations 1,2,3,4, 11, 12 and 13 exceeded both the lead and cadmium Clean-up Criteria. In all, 9 stations (1,2,3,4, 7,10, 11, 12 and 13) had concentrations of 1 or more elements which exceeded the Phytotoxicology Section proposed clean-up criteria for lands slated for residential (unrestricted) development.

Although a clean-up criterion has not yet been established for boron, potentially phytotoxic concentrations (> 50 ppm) of this element were present at Stations 1,2,3,4,11, 12 and 13. Also, Station 1 had an exceptionally high value for aluminum (25%) and a high conductivity (measuring 4.0 millimhos/cm). The pH values, which were slightly alkaline, fell within a range that could support vegetation.

Based on the above findings and in order to avoid possible phytotoxic and human health problems it is recommended that materials from sites 1,2,3,4, 10, 11, 12 and 13 be removed from the park area. Excavation should be based on two factors: the surface area as defined by absence of vegetation and the depth of removal based on the homogeneity of the toxic material. A mixing of the material at station 7 with surrounding soil should be carried out to reduce the chromium, molybdenum and nickel concentrations.

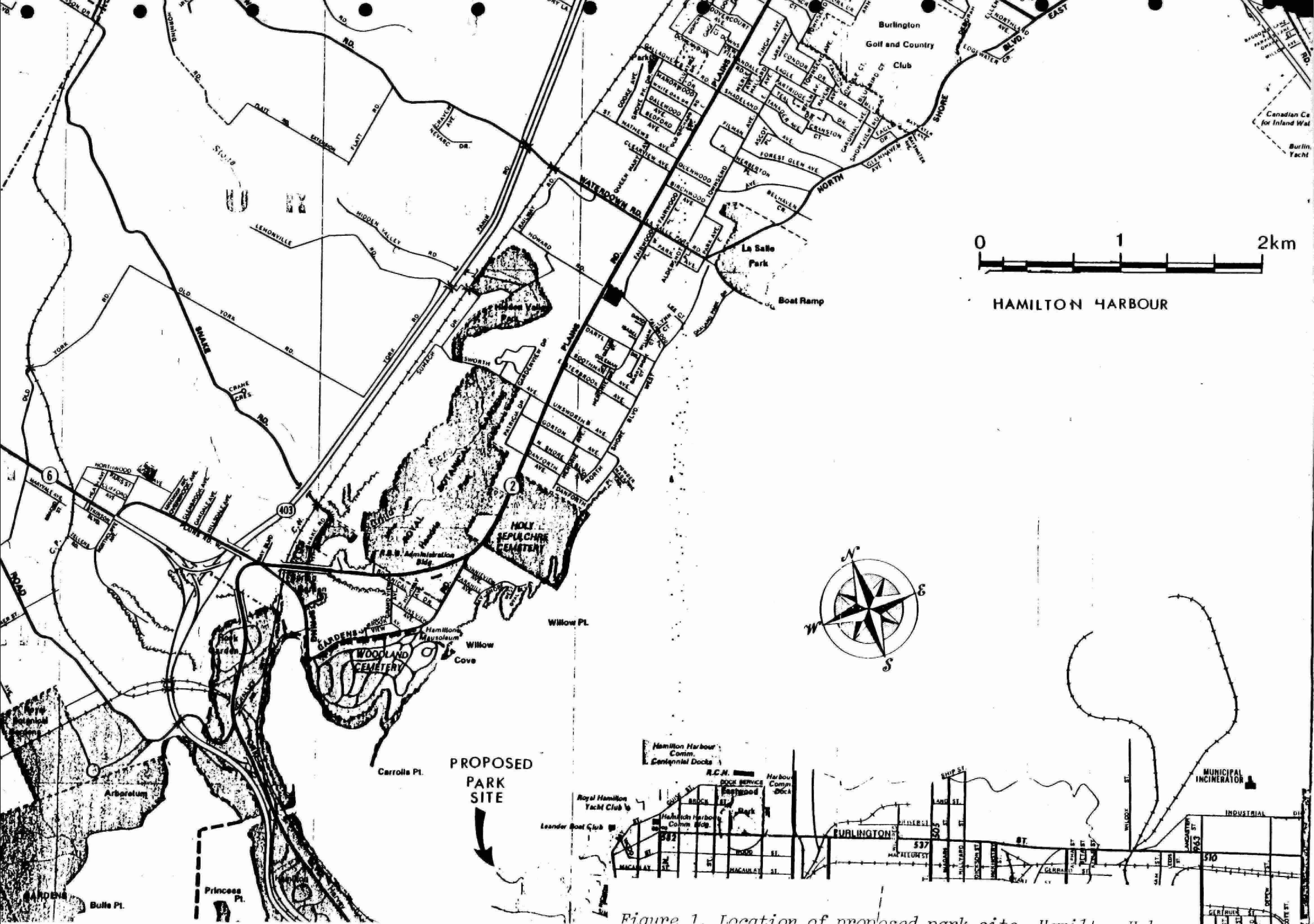


Figure 1. Location of proposed park site. Hamilton, Ontario.

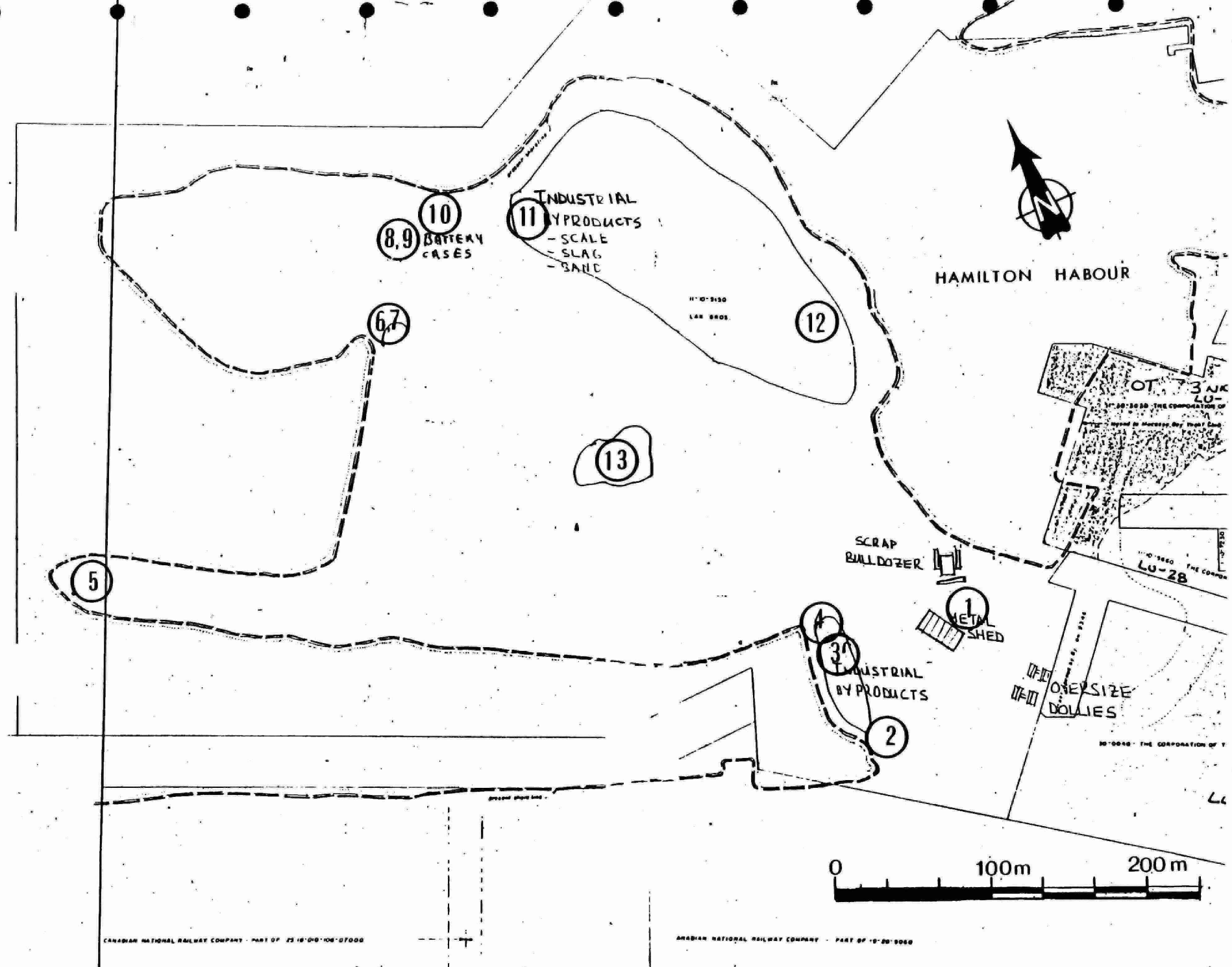


Figure 2. Location of 13 sites where soil samples (0-15cm) were collected
at proposed work location, Hamilton Harbour, November 29, 1984.

TABLE 1 - Sample number, location and description for 13 soil samples collected on the proposed park site, (previously owned by Lax), City of Hamilton, 0-15 cm, November 29, 1984.

Sample Number	Location (see Figure 2)	Sample Description
1 *	just north of metal shed	whitish-grey sandy material (ash?)
2 *	southeast corner of property, from area marked Industrial Byproducts	black fine material (baghouse?)
3 *	from area marked Industrial Byproducts	fine dark brown granular material
4	from area marked Industrial Byproducts	medium brown sandy loam (soil - control)
5	control sample, SW corner	fine dark brown soil (control)
6 *	northwestern part of property	reddish brown granular clay-like material
7 *	northwestern part of property	black coarse sandy material (blast furnace sand)
8 *	from area marked Battery Cases	dark brown sandy-loamy clay - some small pieces of coal present like #4
9 *	from area near Battery Cases location	same as #6
10 *	north edge of property	brown, white and black fine sandy material (blast furnace sand)
11 *	from area marked Industrial Byproducts	brown and black sandy material (blast furnace sand)
12 *	from area marked Industrial Byproducts	medium-brown sandy-loam-like material
13 *	from central area of property (Industrial Byproducts)	dark brown granular-like material similar to #3

* soil does not support vegetation

Table 2

Concentrations *(dry weight) of 16 elements, conductivity and pH in soil samples (0-15 cm depth) collected from 13 stations at the City of Hamilton proposed park site on November 29, 1984. Due to the high concentration of many of the elements, the values given are approximate.

Station	1	2	3	4	5 (control)	6	7	8	9	10	11	12	13	Upper Limits of Normal (Urban) (0-5 cm depth)	Phyto. Sec. Proposed Clean-up Criteria+
Element															
Aluminum	25.0%	1.0%	0.4%	0.9%	1.0%	1.9%	0.5%	1.0%	2.1%	0.1%	1.6%	1.0%	0.5%	-	-
Antimony	13	63	41	3	11	0.5	0.5	1.4	1.3	0.2	12	69	24	8	-
Arsenic	3.9	<u>96</u>	<u>92</u>	9.7	5.5	8.7	1.7	6.8	1.4	1.4	15	<u>87</u>	<u>90</u>	20	25
Boron	690	12000	8200	360	12	34	21	17	46	10	3300	15000	3800	15	-
Cadmium	28	<u>600</u>	<u>450</u>	<u>16</u>	1	1.3	1.0	1.4	1.5	0.6	<u>140</u>	<u>760</u>	<u>250</u>	4	4
Calcium	0.9%	3.5%	3.6%	4%	4.7%	3.6%	1.3%	2.2%	3%	0.6%	2.8%	3.9%	6.4%	3% **	-
Chromium	220	<u>2300</u>	<u>2800</u>	120	16	27	170	20	29	600	310	<u>1800</u>	<u>2300</u>	50	1000 (Cr 3+)
Copper	<u>7200</u>	<u>2200</u>	<u>2400</u>	110	43	13	43	55	12	19	470	<u>1900</u>	<u>1400</u>	100	300
Iron	1.3%	22%	31%	3.3%	2%	3.4%	1.1%	2.2%	3.8%	2.4%	7.7%	19%	31%	3.5%	-
Lead	1800	<u>23000</u>	<u>19000</u>	<u>2000</u>	48	19	50	370	29	21	<u>7100</u>	<u>20000</u>	<u>16000</u>	500	500
Manganese	2000	45000	57000	3100	690	690	1400	830	740	190	10000	36000	47000	700	-
Molybdenum	<u>14</u>	<u>500</u>	<u>250</u>	<u>10</u>	1	1	<u>18</u>	1	2	<u>57</u>	<u>100</u>	<u>500</u>	<u>92</u>	3	5
Nickel	130	<u>1000</u>	<u>290</u>	42	16	28	<u>250</u>	16	29	<u>2500</u>	<u>230</u>	<u>1000</u>	200	60	200
Selenium	4	3	2	0.4	0.2	0.4	1.9	0.6	0.5	0.5	1.6	4.3	0.6	2	5
Vanadium	44	1000	200	31	23	29	11	26	33	9	200	1000	100	70	-
Zinc	<u>14000</u>	<u>280000</u>	<u>180000</u>	<u>7700</u>	140	100	280	250	91	90	<u>69000</u>	<u>320000</u>	<u>82000</u>	500	800
Conductivity millimhos/cm	4.0	1.2	0.3	0.3	0.3	0.1	0.1	0.2	0.1	0.1	0.2	0.4	0.3	1.5 ***	
pH	7.1	8.8	8.5	7.7	7.7	7.9	7.9	7.8	8.0	8.4	8.1	8.2	8.4		

* ppm unless stated in %. ** rural guideline. *** reduction in yield to sensitive species (U.S. Dept. of Agriculture).

+ for lands slated for residential (unrestricted) development.

Note: Underlined results exceed proposed clean-up criteria.



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